DETAILED STATEMENT OF WORK

Attached to and made a Part of contract No. DACW57-97-D-0004

Task Order No. DY01

Modification No. 001

Source Water Protection Plan
Perchlorate Study GIS Development
Lake Belton and Lake Waco, Texas

October 3, 2001

1.0 GENERAL. Task Order No. DY01, is being amended (Amendment No. 1) to develop a Geographic Information System (GIS), undertake a needs assessment, convert applicable data items needed for the GIs and to extend the period of performance through September 2003. All sections of this task order shall remain valid except where discussed below.

2.0 SCOPE.

2.6 NEW TASKS. - GIS DEVELOPMENT AND DATA MANAGEMENT. The A-E shall develop a Geographic Information System (GIS) for use in creating the Source Water Protection Plan. This system shall contain relevant spatial and tabular information for use during the project and possible use in future investigations. The system shall contain a repository of existing study area information to be used digitally, and be used additionally as a project data management system for these digital data. The system will be used to organize, store, manage, analyze, and present pertinent project data. The main features of the GIS development and data management phase will be to convert and load appropriate data into a common data/GIS platform, validate data, integrate with model data, implement customized viewing tools, and above all manage the flow of data throughout the course of the project. The following tasks describe the activities for development and implementation of the Geographic Information System:

2.6.1 Task 1 – DETERMINE APPLICABLE DATA THEMES. The A-E shall review the Data Repository Report developed in the basic task order **DACW57-97-D-0004 DY01** and determine applicability for digital use in a GIS and for the model of each data element. Where reasonable to do so, the following information shall be determined and added to the database:

- scale/accuracy of data including original source of data, relevance for use in GIS

- coordinate system with extent, datum, and projection
- area of coverage
  local, regional, complete/incomplete, etc.
- type of data
  point, line, polygon, raster, tabular (no spatial component)
- relevance for use in model
  (a theme may just be important background information)
- data source
  imagery/photogrammetry, scanned, surveyed, digitized, CADD, cov/shp/geodatabase
- keeper of external digital data source (if applicable) and method for integrating that data within GIS
- results of data validation (see 2.2)

Data themes determined valid for implementation in the GIS shall contain this information within FGDC compliant metadata (see task 4). The Corps of Engineers (Corps) shall be given monthly updates to allow the chance to review as to applicability of data themes and provide input. A list of unavailable data items and a method for finding/ generating missing data shall be included in each update.

2.6.2 Task 2 – NEEDS ASSESSMENT. A needs assessment shall be

undertaken to first review and then recommend a GIS software system appropriate for the client's needs. The software review will take into account the client's current GIS software products and future versions. ArcView version 8, which is fully inte-grated with ArcInfo, shall be considered in the review process. The objectives of the Needs Assessment are as follows:

Compilation of information regarding the current use of mapping technologies
Review and recommendation of GIS software (e.g.; ArcView/ ArcInfo)
Preparation of a Work Plan and flow chart for phased implementation of the GIS
Data transfer and digitizing procedure recommendations
Selection of a standard datum and coordinate system
Data management recommendations
Quality assurance/quality control (QA/QC) procedures for data validation
Development of strategy for distributing this information in an easy-to-use way.

The results of this task will be a Work Plan and Flowchart showing phases involved in implementing data conversion or generation of applicable data layers, GIS development, and model integration, and a Results Report containing analysis of results of the needs assessment and recommendations.

2.6.3 Task 3 – DATA CONVERSION. A key feature of the project is to compile an appropriate "warehouse" of topographical, facility, hydrological, hydro-geological, geological, ecological and analytical GIS data layers in a common system for use as a stand-alone GIS and the model developed in future tasks. Following the selection by the Corps of a common GIS platform, and a common datum and coordinate system, this task will attempt to convert applicable data items determined in task 1 to GIS layers:

- Existing GIS data (e.g.; old versions, ArcView 3.2 to ArcView 8)
- Remote sensing analysis
- CAD drawings
- Scanned images
- Geo-referencing raster images (e.g.; satellite / aerial photographs)
- Implementing compression tools (e.g. MrSID).
- Loading appropriate tabular information, creating spatial links. (i.e. BRA/Texas Tech sample results, relevant EPA/TNRCC data)

Field data including boring logs, ground water measurements, land-use surveys will be entered into the GIS/database system. As well as storing the spatial location and attribute data, the database will store 'time-varying' data such as flow records, changes in water levels, etc.

The development of up to 15 GIS thematic groups (boundary, buildings, cadastre, climate, ecology, environmental hazards, fauna, flora, geology, hydrology, landform, soil, transportation, utilities, etc.) shall be created as GIS layers. Wherever possible, adherence to the Spatial Data Standards database schema shall be followed. Specific coverages will be identified in Task 1. (2.6.1)

2.6.4 Task 4 – GIS DEVELOPMENT. The digital data collected or generated and validated throughout the project shall be stored and managed in a centralized GIS/database system referred to as the "GIS Warehouse." The structure of the tables and spatial files shall be designed to allow easy access to the data while minimizing storage space and duplication. The GIS Warehouse shall have a customized front-end, to allow non-GIS trained personnel to view, use, and plot the data with minimal training and effort, and shall be

delivered in stages throughout the duration of the project.

The following are the key components for this task:

- Implementation of the database schema (see Task 3)
- Methods to normalize data to minimize data storage
- Integrate with client's existing database system, if appropriate
- Integrate data existing spatial and attribute data imported in Task 3 in the GIS
- Implement version control procedures
- Customize data viewing and querying tools
- Develop FGDC compliant Metadata for GIS layers.

GIS Basemaps -- All base maps of the study area required for development of the GIS will be purchased and/or provided directly by USACE. Identification of base mapping needs will be conducted as part of the Needs Assessment.

2.6.5 Task 5 – DATA MODEL INTEGRATION. The GIS Warehouse will be used to build and calibrate numerical models developed for the project, as defined in future delivery order(s). The advantage of managing the model data within the GIS allows efficient and accurate use of all available data whilst avoiding the unnecessary task of manually re-entering the data into selected modeling packages. In addition, the model results can be loaded into the GIS Warehouse and used to analyze potential contaminant impacts. The following are the key activities for this task:

Develop model building and calibration routines
Allow import/export of model results
Create thematic maps and overlaying them on GIS layers
If appropriate, use the 3-D GIS viewer to display predicted contaminant conditions
Facilitate animation of model results.

3.0 DELIVERABLES AND SCHEDULE.

3.9 GIS DEVELOPMENT AND DATA MANAGEMENT. In addition to monthly progress reports with details on what has been achieved in each task detailing problems and successes, the following deliverables shall be furnished:

3.9.1 Task 1: DETERMINE APPLICABLE DATA THEMES. An electronic copy of the Data Repository report/database (as defined in **DACW57-97-D-0004 DY01)** and updated per this task, shall be submitted to the Corps within 30 calendar days from award of this task order and monthly thereafter. When finalized, an additional printed copy of the final Date

Repository database shall be delivered to the BRA and one to the Corps.

3.9.2 Task 2: NEEDS ASSESSMENT. Work plan and Results Report.

A) Work Plan including flow chart for implementing Data Conversion (Task 3), GIS Development (Task 4), and Model Integration (Task 5). The Work plan shall be delivered toe the Corps a draft within 60 days of task order award in electronic format and updated versions monthly thereafter. Two (2) paper copies shall be delivered to BRA and Corps when the project is complete.

B) Results and analysis of needs assessment shall be delivered as a report. The report will be submitted as a draft within 60 days of notice to proceed to allow for comments during a review period followed by the final report submittal with incorporated comments and responses. The draft deliverable will be prepared using Microsoft Office software products. Up to three (3) paper copies of the final document will be provided, along with a .pdf version of the report and two (2) electronic copies in raw format. Electronic copies of the final needs assessment report shall be submitted within 15 calendar days from receipt of comments.

C) Schedules and budgets for all subsequent tasks will be reviewed based on the findings and recommendations of the Needs Assessment. It is anticipated that some adjustments to schedule (either shorter or longer) and budget (either higher or lower) may be required as additional data, assessment, and planning activities are performed, client needs are identified, and project requirements evolve.

3.9.3 Task 3: DATA CONVERSION. Converted data layers and database schema. Data shall be made available to the Government within fourteen (14) calendar days of request during development. Monthly progress reports on data conversion with notes on difficulties and recommendations on overcoming the constraints shall be submitted. The schedule for this task shall be determined during meetings and reflected on the Work Plan previously defined, but activities should be completed by September 2002.

3.9.4 Task 4: GIS DEVELOPMENT. The complete GIS dataset and customization shall be made available to the Government every three (3) months during development. As a final deliverable, after Government acceptance, three copies of the entire dataset shall be delivered on CDROM in a format acceptable to the Corps and BRA. One copy of the GIS dataset shall be labeled for the BRA, and the remainder for the Corps. Any customization or programming resultant due to the execution of this entire delivery order shall be delivered in

uncompiled/ unencrypted form with documentation and shall be the property of the Government for it's own use. Documentation shall consist of a summary page of routines/scripts developed for the project with a maximum of one paragraph per routine and an index of which routine calls/is called by another routine. Each routine shall have internal documentation consisting of a header explaining what the routine accomplishes and the general methodology. This header shall be no longer than 100 lines of 80 characters each. Minimal, but clear, commenting is expected within the scripts. If the Government changes the code from that delivered, the Contractor shall not be required to support those changes, nor affects of those changes on code developed for the project. A sample of documentation will be presented upon request. A hardcopy report format of all customization will be delivered at completion of the Task. If (Commercial Off the Shelf) COTS products are used in the execution of the delivery order, the Contractor shall notify the Government of costs and ordering information for these products. The schedule for this task shall be determined during meetings and reflected on the Work Plan, with anticipated activities complete by September 2003.

3.9.5 Task 5: DATA MODEL INTEGRATION. A report on the use of GIS layers as model inputs or other interactions shall be prepared. The document will detail how model data was integrated within the GIS and how the GIS data was utilized in the model. Draft and final copies shall be submitted electronically, and two (2) final paper copies delivered. The schedule for this task shall be determined during meetings and reflected in the Work Plan, with anticipated activities complete by September 2002.

6.0 POC.

6.4 POC For CORPS - GIS.

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